8

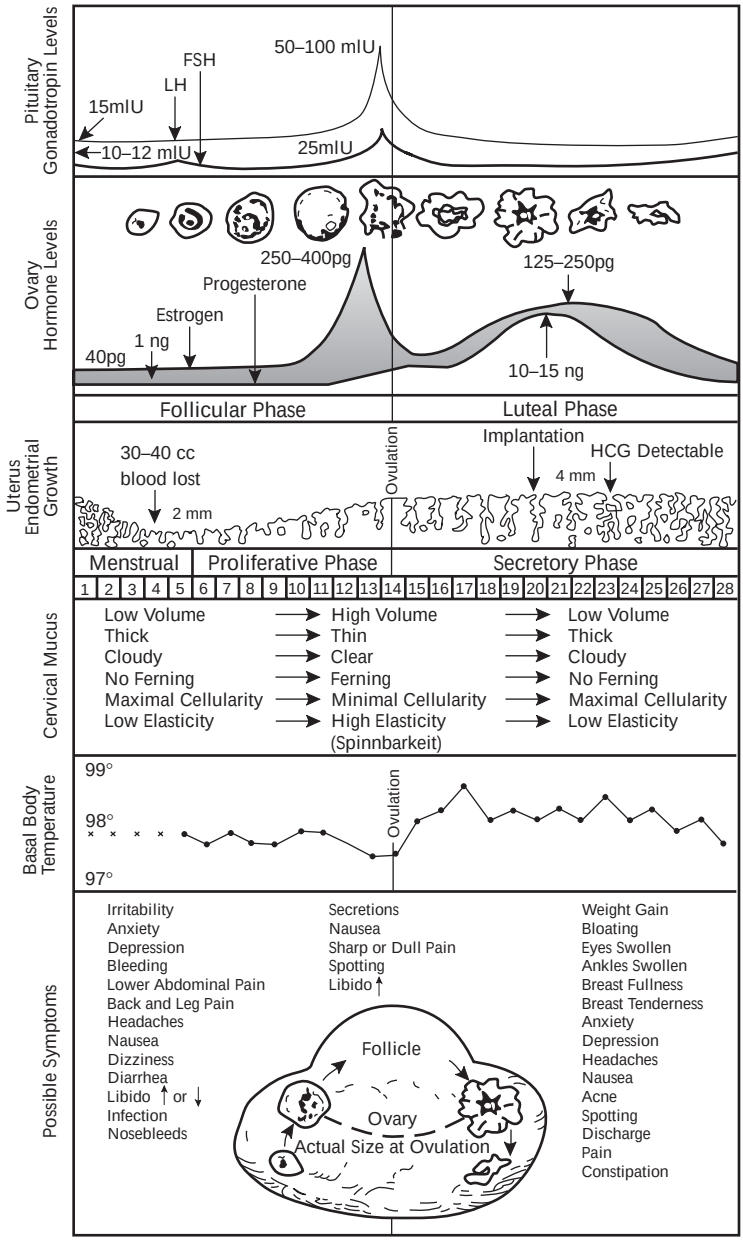
The Menstrual Cycle and Disturbances

Female fertility is cyclic, unlike male fertility, which is relatively constant. Ovulation occurs only once a month and is regulated by a hormone system that involves the hypothalamus, the pituitary gland, and the ovaries. When a woman understands her menstrual cycle, she can better plan, diagnose, and prevent pregnancies. When providers understand the menstrual cycle, they can better assist the client in planning or preventing pregnancies.

MENSTRUAL CYCLE REGULATION

The menstrual cycle is regulated in the hypothalamus. During puberty, the hypothalamus begins secreting hormones that stimulate the pituitary gland to secrete follicle-stimulating hormone (FSH) and luteinizing hormone (LH). In turn, FSH and LH stimulate production of the ovarian hormones estrogen and progesterone and interact with them to regulate ovulation and menstruation. Anything that disrupts the balance of these four hormones during the cycle can disrupt reproductive function. (See Figure 8:1.)

Figure 8:1 Menstrual cycle events: hormone levels, ovarian, and endometrial patterns, and cyclic temperature and cervical mucus changes



FSH = Follicle Stimulating Hormone LH = Luteinizing Hormone
HCG = Human Chorionic Gonadotropin

MENSTRUAL CYCLE LENGTH

In this chapter, the menstrual cycle events are described for an average 28 day cycle; but a normal menstrual cycle can last anywhere from 21 to 35 days. The menstrual cycle can be divided into two distinct phases: The first phase begins with the onset of menses and ends at ovulation and the second phase spans the time from ovulation, until the first day of the next menses. The length of the second half of the cycle is very consistent, usually 14 days. For some women, the length of the first half is less consistent and may last anywhere from 12 to 21 days.

FIRST PHASE OF THE CYCLE (FOLLICULAR PHASE)

Days 1 - 2 The menstrual cycle begins with the first day of menstrual bleeding. The lining of the uterus begins to shed, because levels of estrogen and progesterone have declined from the previous cycle. During the first few days of the cycle, numerous ovarian follicles begin growing. These follicles are balls of cells, each containing an oocyte. During a menstrual cycle a woman may have 10 to 20 follicles growing. The cervical mucus is thick, cloudy, and scant.

Days 3 - 5 For most women, bleeding will end sometime during these days. About one-third of the endometrial lining remains after the bleeding ends.

Days 6 - 11 Estrogen, produced by the ovarian follicles, is primarily responsible for stimulating regrowth of the lining during this time, and thereby ensuring a nutritious home for the potential embryo. This lining will be shed at the end of the cycle if pregnancy is not attained. The hormone levels are generally low during this period, but the pituitary sends increased amounts of FSH to help mature the follicles. Most of the 10 to 20 follicles grow briefly, then recede. One remains to mature. Because it is so receptive to FSH, the remaining follicle continues to grow and produces the oocyte for that cycle. It is also responsible for producing increased amounts of estrogen.

Days 12 - 13 Estrogen production accelerates, triggering a sudden increase in LH. As LH reaches its peak, estrogen production is temporarily inhibited, causing its level to dip. This combination of hormonal surge and dip is thought to cause ovulation. A slow increase in progesterone production also begins here just before midcycle. Because of the temporary midcycle dip in estrogen level, a brief interval of midcycle endometrial bleeding can occur. Ovulation takes place 34 to 36 hours after the LH surge begins (10 to 12 hours after LH peaks).

Ovulation

Day 14 Ovulation may take place earlier or later, but it is normally about 14 days *before* onset of the next menses. The ovary releases a mature egg (oocyte). As the follicle ruptures it releases 1 cc to 10 cc of follicular fluid, and the barely visible oocyte passes into the fallopian tube. Lower abdominal pain is often associated with ovulation. The cervical mucus at ovulation is copious, thin, and clear. This mucus can be stretched into a strand several inches long (this type of mucus is known as spinnbarkeit) and forms a fern pattern when dried on a microscope slide.

The Second Half of the Cycle (Luteal Phase)

Days 15 - 28 After the follicle ruptures at ovulation, the follicle walls collapse, and the follicle cell becomes the corpus luteum. The corpus luteum stays in the ovary and secretes increasing levels of estrogen and progesterone. The increased progesterone causes a change in cervical mucus, making it scant but thick and sticky.

The endometrial lining is now preparing to support an embryo and allow implantation. Progesterone levels reach their peak in the middle of the luteal phase, and FSH and LH levels fall. If fertilization and implantation occur, progesterone will continue to be released by the corpus luteum until the placenta matures. If fertilization does not occur, the corpus luteum disintegrates and the levels of hormones drop off, causing the endometrial lining to shed and menstrual bleeding to begin.

FERTILIZATION AND EARLY PREGNANCY

A woman is most likely to conceive if fresh sperm are present in her reproductive tract when ovulation occurs. Sperm can live in the woman's reproductive tract for as long as 3 to 5 days. The ovum can be fertilized near the day of ovulation, possibly for as long as 12 hours after ovulation; the woman's monthly fertile interval ends the day of ovulation or the following day.[6]

Fertilization involves a complex series of events that occur over many hours. Usually a single sperm attaches to the oocyte. The zona pellucida, a gelatinous halo that surrounds the oocyte, responds by blocking other sperm. The successful sperm releases enzymes that allow it to penetrate the zona and induce final maturation of the oocyte chromosomes. Fertilization usually occurs while the oocyte is in the outer third of the fallopian tube.

- *Day 1 and 2 following fertilization*: Cell division begins and continues for the first 2 days in the fallopian tube, creating a ball of cells called a morula.
- *Day 3 following fertilization*: The morula reaches the uterus, where it continues early embryonic development for another 2 to 3 days before beginning implantation.
- *Day 6 following fertilization*: The embryo is ready to begin implantation.
- *Day 12 following fertilization*: By this time, the embryo has implanted just under the endometrial surface, nourished by maternal blood pools, and the placenta begins to form.

Fertilization, early embryonic development, and implantation are complex processes. Many oocytes and sperm are abnormal and incapable of fertilization; some carry chromosome abnormalities incompatible with embryonic survival. After fertilization, many precisely coordinated events must occur for development and implantation to be successful. As a result, spontaneous loss is very common: approximately 50% of embryos do not survive. Because most of these losses occur during the first 2 weeks after ovulation, the woman is not likely to recognize the spontaneous pregnancy loss. Spontaneous loss is much less common after the first 2 weeks.

It is important for health care providers to understand the intricate functioning of the female hormonal cycles and physiology so they can provide patients with the most appropriate family planning choices. With the exception of barrier methods, all present forms of contraception are based on altering or blocking menstrual cycle events.

DYSMENORRHEA

Menstrual cramping, or dysmenorrhea, may occur with ovulatory cycles. Some women may experience cramping throughout their reproductive lives, some only intermittently, and others experience cramping rarely or never. Uterine cramping is caused by prostaglandins released when the lining of the uterus sheds. These prostaglandins cause uterine muscle to contract and smooth muscle contractions in the digestive tract cause other symptoms such as nausea and diarrhea.

Many women find their cramping pain is relieved by resting, applying gentle heat to the area, or taking common medications such as aspirin or ibuprofen (a very effective prostaglandin inhibitor). Combined oral contraceptive pills can prevent dysmenorrhea because they suppress ovulation. In some cases, progestin-only contraceptives may relieve dysmenorrhea.

When evaluating menstrual cramping, rule out the possibility of infection or early pregnancy because cramping pains may also be caused by disorders that may need treatment:

- Pelvic inflammatory disease (PID) (See Chapter 6 on Sexually Transmitted Diseases.)
- Fibroid tumors (leiomyomata)
- Endometriosis or adenomyosis
- Endometrial cancer
- Ectopic pregnancy, spontaneous abortion, or retained products of conception

ABNORMAL BLEEDING

For most women, the menstrual cycle lasts between 24 and 32 days, with 3 to 7 days of bleeding. The average woman will pass about 15 ccs of bloody fluid. Some women will have spotting (light bleeding) at mid-cycle, which is triggered by the temporary drop in estrogen levels occurring with ovulation. Hormonal contraceptives can alter menstrual bleeding patterns, causing amenorrhea, spotting between periods, or heavier bleeding. (See chapters on various contraceptive methods.)

A woman who experiences abnormal bleeding needs to be evaluated to discover the cause. Table 8:1 lists several reasons for abnormal bleeding. In rare cases, a woman with abnormal bleeding may need emergency care. Heavy blood loss can lead to shock. Early symptoms of shock include severe fatigue, faintness or weakness, dizziness.

MENOPAUSE

During the years before menopause, the ovaries gradually become unable to respond to the hormones released by the pituitary gland. Estrogen production drops and the production of FSH and LH increases dramatically. With these changes, fertility decreases, menstrual cycles become irregular, and menstrual flow tapers off. Some women may experience hot flushes—reddening and sweating of the skin lasting a few minutes and occurring throughout the day. These symptoms gradually improve within the first few years after menopause. Other menopausal symptoms include problems associated with persistently low estrogen levels: vaginal dryness and diminished bladder control. These symptoms generally begin months or years after menopause. Once women reach menopause, their need for calcium increases. Advise clients about how to increase calcium in their diets. Because uterine cancer is more common among women who have achieved menopause, suspect and evaluate any vaginal bleeding that occurs after menopause.

Table 8:1 Causes of abnormal bleeding

Pregnancy-related causes
- Spontaneous bleeding in early pregnancy
- Spontaneous abortion (miscarriage)
- Ectopic pregnancy
- Abnormal pregnancy (molar)

Vaginal causes
- Infection
- Human papilloma virus (warts)
- Vaginal atrophy
- Injury
- Foreign body
- Cancer

Cervical causes
- Infection
- Human papilloma virus
- Herpes
- Syphilis
- Ectropion
- Cervical polyps
- Cancer

Uterine causes
- Uterine polyps
- Benign fibroid tumors
- Infection
- Endometriosis
- Intrauterine device (IUD)
- Hyperplasia
- Cancer

Ovarian causes
- Follicular cyst
- Corpus luteum cyst
- Polycystic ovary disease
- Ovarian cancer

Other causes
- Pelvic Inflammatory Disease (PID)
- Hormone treatment
- Thorazine or other psychiatric drugs
- Aspirin, antiprostaglandin drugs
- Anticoagulant drugs
- Blood clotting or platelet disorders
- Leukemia
- Liver disease

Source: Stewart et al. (1987)

Hormone Replacement Therapy

In some women, menopause symptoms can be severe. Many of the symptoms can be treated with hormone replacement, if it is available. Many women report fewer hot flushes, less irritability, and improved vaginal lubrication. In addition, hormone replacement therapy prevents osteoporosis and probably cardiovascular disease.[1] The risk of uterine cancer can be decreased by combining estrogen treatment with at least 12 days of progestin each month. The risk of breast cancer needs further study because research results conflict. Advise clients to examine their breasts for masses and to have their breasts examined professionally as well.

Not every women can take estrogen treatment. Women with the following conditions should not take this therapy:

- Unexplained vaginal bleeding
- Active liver disease
- Chronic impaired liver function
- Recent blood clot formation (thrombosis)
- Cancer of the breast
- Cancer of the endometrium

A typical regimen consists of conjugated estrogen 0.625 mg with medroxyprogesterone acetate 5 mg daily.[4] For some women who cannot take estrogen, medroxyprogesterone acetate 10 to 20 mg daily or Depo-Provera 150 mg every 3 months are alternatives to protect against hot flushes and, possibly, bone loss. Estrogen-containing vaginal cream helps alleviate vaginal dryness. Women who must avoid estrogen should be advised to avoid herbal preparations such as ginseng because they may have estrogen effects.

ADNEXAL MASS

Adnexal masses are extremely common. In some cases, the client may complain of pain in the lower abdomen (usually one-sided), tenderness, pain during intercourse, or a sense of fullness in the abdomen. Often, the client may have no symptoms.

ECTOPIC PREGNANCY

This is an emergency condition that must be ruled out whenever a mass occurs in the adnexa. Signs and symptoms may include vaginal bleeding, mild pregnancy symptoms such as breast tenderness or nausea, persistent pain that is one-sided or more generalized in the lower abdomen, a uterus size that is smaller than last period dates would suggest, or tenderness in the area of the fallopian tube. In some cases, a woman may have no signs or symptoms of an ectopic pregnancy. Internal bleeding from a ruptured ectopic pregnancy causes severe pain and can lead to shock. Frequent, careful follow-up, with daily examinations, may be needed until the diagnosis is clear. (See Chapter 9 on Pregnancy Diagnosis for further discussion.)

CANCER OF THE OVARY

An ovarian enlargement that persists, is larger than 5 cm, or occurs in a women over age 30 needs a full evaluation. Rule out the possibility of pregnancy or infection. If pregnancy and infection are ruled out, obtain an image of the mass, either by x-ray or ultrasound. Even if the results are reassuring, surgery is likely to be necessary.

FUNCTIONAL OVARIAN CYST

Sometimes a normal ovarian follicle or corpus luteum can be unusually large. These cysts occasionally are as large as 8 cm to 10 cm in diameter and can disrupt the menstrual cycle. Rarely, a cyst causes pain from leakage or torsion (twisting) of the adnexa. In most cases,

however, the cyst and its symptoms resolve within a few weeks. If the ovary is 5 cm or smaller in a client who is younger than 30 years of age, not pregnant, and does not have an infection, arrange for a follow-up pelvic exam in 2 to 4 weeks.

VAGINAL HYGIENE

A woman's vagina normally maintains its own hygiene. Menstrual blood is not dangerous or dirty. Absorbent materials attached to undergarments or tampons placed in the vagina are sufficient to absorb blood and prevent the staining of clothing. These absorbent materials should be changed frequently throughout the days of blood flow.

Douching is unnecessary to maintain vaginal hygiene. Moreover, douching is associated with an increased risk for PID and ectopic pregnancy.[2,3] Pregnant women especially should be warned about the risks associated with douching.

A persistent vaginal odor or abnormal discharges that does not clear on its own can be a sign of vaginal infection. Make certain the vagina does not contain any retained materials such as a tampon or other inserted items. Evaluate for infection. (See Chapter 6 on Sexually Transmitted Infections.)

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